DOCUMENT RESUME

ED 293 842 SP 030 231

AUTHOR Pascal, Anthony
TITLE The Qualifications of Teachers in American High Schools.
INSTITUTION Rand Corp., Santa Monica, Calif.
REPORT NO Rand-N-2547-CSTP
PUB DATE Feb 87
NOTE 51p.
AVAILABLE FROM The RAND Corporation, Publications Dept., 1700 Main St., Santa Monica, CA 90406-2138 ($4.00).
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Academic Education; High Schools; *Institutional Characteristics; Intellectual Disciplines; Public Schools; School Surveys; *Secondary School Teachers; Teacher Background; Teacher Certification; *Teacher Qualifications; *Teaching Experience

ABSTRACT

This monograph describes the formal qualifications of the teachers currently teaching in public high schools and notes the variations of qualifications among schools with different characteristics. A survey of an average of 30 randomly selected teachers in each of 340 comprehensive high schools obtained information on: (1) the number of college courses completed in the teacher's primary subject (PS); (2) whether the PS was a major or minor in college; (3) whether or not the teacher was certified in the PS; and (4) years of teaching experience. Results of the survey indicated: (1) there was a rather impressive level of formal qualifications, overall and subject by subject; (2) the highest levels of qualifications were in the humanities, followed by science, mathematics, and social sciences; (3) the ethnic status of the student body had little relation to the level of teachers' qualifications; (4) the biggest differences in teacher qualifications across school types were between schools that send relatively many students to college and those that send relatively few; and (5) the least qualified teachers were spread fairly evenly across all types of high schools. Survey data are displayed in tables. (JD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

The research described in this report was conducted in RAND's Center for the Study of the Teaching Profession. The Center's sponsors in 1985-87 were the Metropolitan Life Foundation, the James S. McDonnell Foundation, the Conrad N. Hilton Foundation, and the Aetna Life and Casualty Foundation.

The RAND Publication Series: The Report is the principal publication documenting and transmitting RAND's major research findings and final research results. The RAND Note reports other outputs of sponsored research for general distribution. Publications of The RAND Corporation do not necessarily reflect the opinions or policies of the sponsors of RAND research.

Published by The RAND Corporation
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90406-2138

A RAND NOTE

N-2547-CSTP

The Qualifications of Teachers in American High Schools

Anthony Pascal

February 1987

4

RAND

Center for the Study of
the Teaching Profession

PREFACE

This Note was prepared under the auspices of RAND's Center for the Study of the Teaching Profession. It is intended to inform educational decisionmakers and analysts who may be considering improvements in the collection and evaluation of data and the formulation of policy with respect to teacher qualifications.

The author would like to thank the people who contributed ideas and suggestions helpful in the development of this study. They include Patricia Morgan of *Science* magazine and RAND colleagues Linda Darling-Hammond, David Grissmer, Lorraine McDonnell, Jeannie Oakes, and Arthur Wise. Particular thanks go to Stephen Carroll, whose comments on an earlier draft were of great benefit.

SUMMARY

This Note attempts to describe the formal qualifications of the teachers currently teaching in America's public, comprehensive[1] high schools and to determine whether those qualifications vary appreciably among schools with different characteristics. The analysis was performed on data collected in the 1984 High School and Beyond (HSB) surveys of school administrators and teachers conducted by the National Opinion Research Center (NORC) for the National Center for Education Statistics, U.S. Department of Education. NORC collected data on an average of 30 randomly selected teachers in each of 340 public, comprehensive high schools.

For the purposes of this study, teacher qualifications were measured by the number of college courses the teacher had completed in her or his primary subject (PS), i.e., the subject the teacher primarily taught, whether the teacher majored or minored in the PS, whether she or he was certified in the PS, and years of teaching experience. More subtle dimensions and qualifications, such as quality of the courses taken and institutions attended, could not be investigated with these data, nor were any direct measures of teacher competence in particular subjects available.[2]

Despite a mounting chorus of complaints about the low level of formal qualifications of the nation's high school faculties, the HSB data indicate a rather impressive level of formal qualifications, overall and subject by subject.[3] The average high school teacher

---

[1]Comprehensive or general high schools teach standard subjects to all students, i.e., they are not specialized toward vocational education nor do they enroll only handicapped students.

[2]There was also no way to adjust completely for the interactions between teacher qualifications and school course offerings in characterizing schools or for district assignment policies in characterizing districts.

[3]Because the HSB survey did not ask the frequency of teacher assignments to non-PS courses, we have not analyzed teacher qualifications in these less-frequently taught subjects. It is possible that in certain subjects or in certain types of schools, many teachers are assigned to teach non-PS courses for which they are poorly qualified.

surveyed had taken about 15 courses in her or his PS; almost two out of three teachers of "solids" had majored in the PS, while more than eight out of ten had at least a minor in the PS. More than nine-tenths were certified, and the average length of teaching experience was 15 to 16 years. The highest levels of qualification were registered by teachers in the humanities, followed by science, mathematics, and social sciences, in that order. However, the inter-PS differences among the teachers were not great.

The conventional wisdom holds that schools in certain locations--e.g., in rural areas and in the South--and schools with largely minority or low-income student bodies have the least-qualified teachers. According to the HSB data, however, the disadvantages for nonmetropolitan and Southern schools were slight. The ethnic status of the student body also had little relation to the level of formal qualifications of the teachers; schools with a high proportion of minority students, in fact, tended to have slightly more-qualified teachers. Schools with high proportions of "disadvantaged" students (as judged by the principal) did have less-qualified teachers, but the differences between those schools and schools with low proportions of disadvantaged students were still modest.

The biggest differences in teacher qualifications across school types were found between schools that send relatively many of their students on to college and those that send relatively few. (Interestingly, the college-bound variable had little association with the ethnic or social makeup of the student bodies.) Schools with larger student bodies and those located in higher-spending school districts had somewhat more-qualified teachers. Although these effects were more pronounced than the effects of location and student body composition, they were still not substantial. These relationships are confirmed in subject-by-subject comparisons across types of schools.

The differences in teacher qualifications between the 24 "most privileged" and the 22 "least privileged" schools (identified on the basis of the HSB data) were in the expected directions but, again, were far from overwhelming. It was also found that the least-qualified teachers (defined as having either no certification or not even a minor in the PS) were spread fairly evenly across all types of comprehensive high schools.

That larger, higher-spending, and more college-oriented high schools in metropolitan areas should have teachers with somewhat more impressive formal qualifications is perhaps not surprising. More highly qualified teachers are likely to be attracted to such schools.

These results clearly provide no justification for massive new policy interventions to upgrade the formal qualifications of teachers or to redistribute teachers across schools, although it is conceivable that greater equity in outcomes might be furthered by assigning the most-qualified teachers to the most-disadvantaged schools.

Future research in this area should seek to determine whether the observed differences in qualifications have important effects on student learning. The main policy task is to identify the teacher qualities--rather than qualifications--that result in better education for students.

CONTENTS

PREFACE iii

SUMMARY v

TABLES xi

Section
I. INTRODUCTION 1
Background 1
Data Used in this Study 4

II. THE ANALYSIS OF TEACHER QUALIFICATIONS 7
Defining Teacher Qualifications 7
Factors Associated with Variations in Teacher Qualifications 10
Identifying High-Qualification and Low-Qualification Schools 18
Where Do "Unqualified" Teachers Teach? 23
A Note on Teacher Practices 24

III. CONCLUSIONS 26
Reprise of Findings 26
Policy Implications 28

Appendix: CHARACTERISTICS OF TEACHERS OF SELECTED SUBJECTS 31

REFERENCES 43

TABLES

1. Characteristics of teachers in public general high schools, by subject: 1984 8
2. Teacher and school characteristics, by type of school: 1980, 1982, 1984 12
3. Teacher qualifications, by subject and type of school: 1980, 1982 1984 15
4. Relationship of school characteristics to selected measures of teacher qualifications 19
5. Criteria for type X and type Y schools 19
6. Characteristics of type X and type Y schools 20
7. Teacher qualifications and offerings in type X and type Y schools 22
8. Characteristics of schools with "unqualified" teachers of solid subjects 24

A.1. Vocational education teacher characteristics, by type of school 32
A.2. English teacher characteristics, by type of school 33
A.3. Modern language teacher characteristics, by type of school 34
A.4. Biology teacher characteristics, by type of school 35
A.5. Chemistry teacher characteristics, by type of school 36
A.6. History teacher characteristics, by type of school 37
A.7. Civics and government teacher characteristics, by type of school 38
A.8. Basic mathematics teacher characteristics, by type of school 39
A.9. Intermediate math teacher characteristics, by type of school 40
A.10. Advanced math teacher characteristics, by type of school 41

I. INTRODUCTION

The analysis presented here attempts to describe the qualifications of teachers currently teaching in American public, comprehensive high schools and to identify the characteristics of schools that have more-qualified and less-qualified teachers. Qualifications, for this study, consist of the intellectual capital acquired by teachers, i.e., college training in the subjects most frequently taught, years of experience, and other such characteristics.

BACKGROUND

For some time, critics of the American educational system have argued that there is a serious maldistribution of teaching personnel resources in American schools. Defining teacher resources in terms of quality, training, certification, salary, and the like, these critics have claimed that certain kinds of schools in certain kinds of districts have been systematically deprived of teachers with adequate and appropriate training. More recently, there have been allegations of wholesale misassignment of teachers--that is, assignment to courses for which the teachers are inadequately prepared--across the entire spectrum of schools. However, newly available databases allow us to investigate the validity of such criticisms more rigorously than has been possible in the past. These data enable us to establish qualification criteria in terms of teachers' intellectual capital and then to compare different types of schools in terms of the intellectual capital embodied in their faculties.

A recently published report from the Council for Basic Education (CBE), *Making Do in the Classroom: A Report on the Misassignment of Teachers* (Robinson and Pierce, 1985), makes a forceful case for the prevalence and seriousness of the misassignment problem. However, the data used by Robinson and Pierce were obtained from state departments of education (almost all of which have an incentive to understate the magnitude of misassignment) and from a review of the very sparse literature on the subject. Based on this information, the report cites

many states in which one-fourth or more of all classes in the sciences and one-tenth or more of those in the humanities are taught by "unqualified" teachers--qualification being variously defined with respect to certification and college training.

The report asserts that Utah provides more accurate figures than many other states because neither its schools nor its teachers are "penalized" for out-of-field assignments. In Utah's school districts, over 80 percent of the geology and geography courses, almost 30 percent of the mathematics courses, and 25 percent of the biology courses were found by Robinson and Pierce to be the primary assignments of teachers who did not have even a college minor in their subject.

The CBE study, cosponsored by the American Federation of Teachers, decries the shortchanging of students and parents and the betrayal of teachers that these practices represent:

> Underlying these circumstances lies a pernicious notion on the part of educators and much of the general public as well: that teachers are mere "facilitators" of learning; that they are secondary conduits of information already contained in textbooks. Once people have been trained as teachers "in general," this prejudice supposes, they have the ability to teach any subject at all (Robinson and Pierce, 1985, p. 7).

In a study performed for the Southern Regional Education Board, Galambos, Cornett, and Spitler (1985) examined the transcripts of 6,000 education majors and a control group of arts and sciences students, all of whom graduated from 17 large Southern universities in 1982 and 1983. The objective of the study was to determine how academic preparation varied between these groups. It was found that teacher trainees earned fewer general credits than the control group and that a smaller proportion of the future teachers' credits were in upper-division (junior and senior year) courses. The study also found that teachers took fewer hours in the more "rigorous" subjects (e.g., mathematics, physics, chemistry, economics, political science, and philosophy) and more in the "softer" subjects (e.g., biology, geology, fine arts, and, of course, education).

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Meira Allen

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

College students destined for teaching, according to Galambos, Cornett, and Spitler, take a smaller proportion of their courses in their academic major field than do other graduates in the same majors. In the hard sciences, the prospective teachers in the study took 33 percent of their courses in their major field, whereas nonteachers took 50 percent; for social science majors, the figures were 40 percent and 70 percent. Teacher trainees majoring in science rarely took physics or chemistry (they gravitated toward biology), and those majoring in social science tended to take history courses instead of economics or political science. The study made no attempt to link the college training of teachers with what they actually taught once at work in high schools.

Neither the CBE nor the Southern Regional Education Board study explores how misassignment varies by type of school. In fact, the CBE report argues that only on-site audits can illuminate school-by-school variation. The present study did not employ audits, but it *is* based on data collected in interviews with teachers.[1] Such data would appear to be more trustworthy than surveys of administrators or district/state officials, since teachers have much less incentive to underreport misassignment.

Finally, it must be noted that defining a teacher's qualifications in terms of her or his preparation in a particular subject is at odds with a venerable line of argument holding that the ideal teacher is broadly educated in the liberal arts and pedagogically prepared through courses in educational philosophy and practice. Specialization, according to this view, comes at the price of breadth. The present study, however, concentrates on preparation in the particular area of teaching as a way of testing the validity of contemporary concerns about ill-prepared teachers and their distribution across schools, and because virtually no data on teacher competence so broadly defined are available.

---

[1]No attempt was made to check the veracity of teacher responses against school administrative records.

DATA USED IN THIS STUDY

The release of the Teacher Survey data files of the High School and Beyond (HSB) study presented a unique opportunity to analyze teacher assignment patterns in secondary schools for a recent year, 1984. In the survey, teachers were asked a number of questions about course assignments and their own educational preparation. An HSB School Survey conducted in 1980 with a follow-up in 1982 provides considerable information on the attributes of the high schools in which these teachers were employed. Unfortunately, there is little information on sampled school districts, and the HSB data do not identify the states in which the schools are located.

The Teacher Survey

The National Opinion Research Center (NORC), which collected the data for the HSB survey, received responses from about 11,000 teachers in 456 high schools. Of these, about 70 percent were public schools. About 86 percent of the schools queried responded, and the teacher response rate for responding schools was about 80 percent. (NORC had randomly selected 30 teachers in each school.) Teachers were asked about the courses they had been assigned and about their own qualifications to teach those courses. They provided information on:

- Assignments; courses most frequently, second most frequently, and third most frequently taught[2] in past four years (divided into 36 categories covering humanities, sciences, social sciences, mathematics, and other subjects).
- Specific preparation; number of college courses in subject most frequently (and second and third most frequently) taught; whether certified in these courses.
- General preparation; level of education attained; name of college attended; years of full-time experience; whether tenured.

[2]Unfortunately, teachers were not asked how often they taught these courses outside their primary subject area.

In addition, questions were asked about average class size, teacher absences, hours the teacher devoted to preparing lessons, percent of class time devoted to instruction, and the teacher's homework and examination policy to investigate certain aspects of the conditions under which a given course was taught. NORC also collected data on teachers' ethnicity, gender, job satisfaction, salary, and hours of teaching.

Data on Schools and Districts

The HSB school questionnaires provide useful data on schools, but considerably less about the districts in which the schools are located. Available school data include:

- Number of students.
- Auspices of school (i.e., public, Catholic, other private).
- Type of school (i.e., general, vocational, or special education).
- Ethnic composition of student body.
- Percent of students non-English-speaking at home.
- Socioeconomic status (SES) of student body (e.g., whether school participates in ESEA-Title I for economically disadvantaged students, percent of most recent graduating class in college, percent of students who drop out, percent of students in remedial programs, percent of students judged to be disadvantaged, percent of students in academic programs).
- Richness of academic offerings (e.g., whether school offers calculus, physics, third-year foreign languages, advanced placement courses).
- Number of volumes in library.
- Staff/student ratio.
- Teacher/student ratio.
- Teacher tenure, turnover, and absenteeism patterns.

- Teacher starting salaries.
- Teacher unionization.

The school districts' regions and types (urban, suburban, or rural) and their spending per pupil are also given.

The most troubling of the missing variables relate to the size of districts and the states within which they are located. District size is probably strongly and inversely related to frequency of misassignment, since smaller districts probably have to make do with fewer specialists and have less flexibility in matching teachers to the demand shifts occasioned by changes in educational approach or demographic transition. State identifications would be useful because states make and enforce assignment rules. However, the link between teacher qualifications and state policy postures is not observable in the HSB data.

II. THE ANALYSIS OF TEACHER QUALIFICATIONS

DEFINING TEACHER QUALIFICATIONS

What do we mean by qualifications? Numbers of courses taken in particular subjects--e.g., the subject the teacher most frequently teaches, called the primary subject (PS)--are often used to measure qualifications. But course counts ignore the *quality* of both the institution the teacher attended and the instruction she or he has experienced.[1] Missing also are data on how well the teacher did in the classes in question. And course counts clearly do not by themselves determine teacher effectiveness. Thus variables based on course counts should be considered only proxy measures for teacher qualifications. True measures of qualifications could be constructed only through testing of teacher knowledge in subject matter, observation of how the teacher applies that knowledge in the classroom setting, and other such direct methods.

Nevertheless, school boards do establish salary schedules that provide incentives for teachers to take more courses. Moreover, the public may judge how well teachers are prepared on the basis of their college course records. So course counts are of interest.

The primary measures of teacher qualifications reported in the HSB survey are shown in Table 1. The first measure is the number of college courses in the teacher's PS,[2] where a course is defined as two to five classroom hours per week over a semester or a quarter.

---

[1]Time in the college classroom is also not accounted for. The HSB study defines a course so broadly that classes meeting for a total of anywhere from 30 to 100 hours are counted as equivalent.

[2]No attempt is made here to evaluate college preparation in the teacher's second or third most frequently taught subjects because neither the HSB nor any other data source identifies the fraction of all courses in a subject taught by teachers for whom it is not the PS. Thus we have no way of knowing whether inadequate preparation in courses other than the PS is a substantial or a trivial problem.

Table 1

CHARACTERISTICS OF TEACHERS IN PUBLIC GENERAL HIGH SCHOOLS, BY SUBJECT: 1984

Subject	Characteristic									No. of Observations	
	No. of Courses in PS	% with PS Major (20)	% with PS Major (13)	% with Minor	% Certi-fied	Years Expe-rience	Salary ($ 000)	% Male	% Non-white	Teachers	Schools
All	15.5	34	59	82	93	15	23.2	55	11	7544	340
Phys. ed. + special ed.	16.2	35	49	85	93	12	21.0	33	16	527	224
Voc. ed.	13.5	30	47	69	88	16	23.4	59	12	1454	327
All solids	16.0	35	63	86	93	16	23.3	56	10	5442	340
All humanities	19.0	50	79	94	93	16	22.9	40	09	2303	336
English	18.5	46	79	94	93	15	22.7	32	10	1368	330
Classics	17.8	39	75	89	89	21	25.4	43	11	28	28
Modern lang.	18.5	44	76	95	93	16	23.4	35	06	363	210
Other humanities	20.7	67	84	92	91	16	22.8	61	09	544	275
All sciences	15.1	28	58	86	90	16	23.6	69	10	923	319
Biology	17.5	38	72	94	90	16	23.2	65	11	409	255
Chemistry	13.7	20	50	84	92	18	24.6	68	07	201	177
Physics	13.8	21	58	84	97	18	25.8	95	07	62	60
Other sciences	12.7	22	43	75	89	15	22.9	70	11	251	175
All soc. sci.	13.2	22	45	79	94	17	24.1	74	09	1086	322
History	14.1	24	47	85	94	17	24.1	76	08	678	298
Govt. & civics	12.0	16	40	71	92	15	23.3	71	15	171	140
Economics	12.8	23	43	74	96	17	24.6	64	08	80	76
Other soc. sci.	11.2	17	41	64	94	17	24.4	69	08	157	124
All math	13.4	22	50	76	94	16	23.3	62	12	1130	328
Basic math	11.4	16	38	67	90	14	20.9	60	20	250	165
Interm. math	14.2	24	55	81	96	16	23.5	60	10	733	303
Adv. math	15.6	30	64	82	98	19	27.2	81	01	84	73
Computer	9.6	14	29	49	79	14	23.9	70	08	63	61
All other	13.2	27	42	76	88	15	23.5	63	06	121	94

Course counts can also be converted into the percentage of teachers in a given school type or subject with the equivalent of a college major or minor in the subject. We used two definitions of "major," a restrictive definition based on a standard of 20 undergraduate courses in a subject, as reported by registrars in a sample of universities contacted, and a less restrictive 13-course standard, as suggested in Galambos, Cornett, and Spitler (1985).[3] A minor was defined to be eight courses in a given subject, again based on discussions with university officials.

As shown in Table 1, 93 percent of the teachers were certified in their PS; only for computer courses was the fraction below 88 percent. Why, then, are there so many complaints about lack of preparation, when so many teachers evidence certification? Certification is obviously an inadequate variable for assessing the state of teacher qualification. Roth and Mastain (1984) show that 29 states issue certificates so broadly defined that a holder can teach any subject within, say, science or language arts. Moreover, in 22 states emergency or provisional certificates--which usually do not even require a baccalaureate degree--are issued on the basis of requests from local district employers, who often petition when an available teacher lacks conventional preparation for the course being offered. In California, Colorado, Florida, Ohio, and Texas, 10 to 20 percent of all new credentials in recent years have been "emergency" credentials (Task Force, 1984; Robinson and Pierce, 1985).

The HSB also investigated total years of experience and salary, also indicated in Table 1. Sex and racial data are shown as well because they provide an interesting sidelight, although they reveal nothing about qualifications.[4]

---

[3]The average graduate of the 17 large Southern universities surveyed who majored in mathematics, English, languages, science, or social sciences took 40 semester hours in her or his major (Table 19, p. 48). If the average course consists of three semester hours, approximately 13 courses would have been taken by majors in the subject.

[4]Other measures were collected--whether the teacher had tenure, the teacher's descent (e.g., Hispanic), years of education--but they are not shown in the tables in this Note because they varied so little across schools and subjects. (The means of these measures were, respectively, 85 percent, 4 percent, and 16.6 years.) The HSB also collected some

The number of teachers in the given categories and the number of high schools in which they teach are also given in the last two columns.

In the "Subjects" column of Table 1, "All solids" contains all the courses listed below it except the last category, "All other." The modern languages are primarily German, French, and Spanish, but a few teachers of Japanese, Russian, and other languages are included. "Other humanities" includes art, music, drama, and speech. "Other sciences" includes health. "Other social sciences" includes psychology, anthropology, sociology, and ethnic studies. "Basic math" includes remedial and business math. "Intermediate math" includes algebra and trigonometry. "Advanced math" includes analytic geometry and calculus. "All other" is a hodgepodge that includes ROTC, nursing, journalism, and the like.

FACTORS ASSOCIATED WITH VARIATIONS IN TEACHER QUALIFICATIONS

Subject Taught

What does Table 1 tell us? The humanities teachers have the most training in their PS, averaging about 19 college courses. About half the humanities teachers have college majors in their PS, using the more restrictive definition of major; almost four-fifths have majors, if we use the looser, 13-course definition. Science teachers are the next most highly trained in their PS, followed by intermediate and advanced math teachers, but not teachers of basic mathematics or computer courses.[5] Social science teachers score a close fourth.[6] Average

---

working-condition measures (average class size and hours per week the teacher was assigned to the classroom) that did not vary greatly in this random sample of schools and teachers--virtually all had class sizes between 20 and 25 and virtually all taught between 21 and 27 hours per week.

[5]Although the HSB questionnaires seemed to be clear in asking respondents how many courses they took in their PS, the actual responses indicate that teachers may have misinterpreted this question. It is difficult to believe, for example, that the average high school physics teacher really took over 13 physics courses in her or his college career, although it is easy to believe that she or he may have taken over 13 science courses.

[6]The statistics on lack of a minor for humanities, math, and biology teachers are not as discouraging as in those reported for Utah in Robinson and Pierce (1985).

salaries are quite close across subjects but, interestingly, tend to show an inverse relationship with amount of training.[7] Finally, there was a remarkably even distribution in years of teaching experience.

Type of School[8]

Table 2 presents data for different types of schools. (These are averages across the 340 high schools surveyed; each school is weighted by the number of teachers on its staff in the HSB sample.) This information provides a crude test of the conventional wisdom concerning the relationship between school characteristics and differences in teacher qualifications. Many believe that schools dominated by disadvantaged students have the least-qualified teachers. School size and location and district wealth are also thought to be associated with levels of teacher preparation.

The variables "percent who minored in their subject" and "percent certified" are not shown because they differ so little across this sample of teachers. School-level variables shown include "percent of

---

[7]Correlation statistics revealed that the subjects in which teachers' course records were most impressive were not correlated with the highest salaries. Instead, mean salaries were strongly correlated with the fraction of teachers of the subject who were male.

[8]We must note a serious problem in the use of course counts to assess the qualifications of a school's teachers. The count for a school is determined by both the college courses teachers have taken *and* the courses the high school offers. In comparing two schools with identically prepared faculties, the one that offers the simplest course menu will appear to have the more-qualified teachers. Suppose, for example, a rural school and an urban school each have five math teachers, all of whom took ten math courses in college. But assume also that the urban school offers calculus, whereas the rural school does not. The urban school will lower the teacher-qualifications average for all urban schools, since it has only modestly qualified calculus teachers, while the rural school will not affect the average for calculus teachers in rural schools, because it has none at all.

There are also problems in using teacher course counts to compare districts. Districts that shift teachers among schools to match variations in school course offerings will appear to have more-qualified teachers than districts that do not, even if there are no overall differences in the qualifications of the respective teacher forces.

Thus, it must be kept in mind that differences in school course offerings and district assignment policies can also affect the course-count-based qualifications of teachers in certain types of schools or school districts.

Table 2

TEACHER AND SCHOOL CHARACTERISTICS,[a] BY TYPE OF SCHOOL: 1980, 1982, 1984

Type of School	Characteristic								
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Non-white	% Adv. Deg.	% >10 Yr. at School	School S/T Ratio
All	15.5	34	15	232	55	11	51	42	19
Region									
Northeast	15.6	34	16	243	59	05	63	50	16
South	15.3	33	14	195	41	19	44	31	20
Midwest	15.5	34	16	246	61	08	52	44	19
West	15.6	35	16	251	63	08	46	48	22
Metro status									
Central city	15.9	36	17	245	51	21	56	45	20
Suburb	15.4	32	16	242	55	07	53	42	20
Nonmetro	15.3	33	14	201	59	06	43	40	18
Race[b]									
High black (>25%)	15.4	34	16	227	45	30	52	37	19
Low black (0)	15.2	32	15	220	62	03	45	42	18
SES[c]									
High dis. (>25%)	15.4	34	15	220	49	24	48	39	20
Low dis. (<3%)	15.7	35	16	242	57	06	51	42	19
College-bound[d]									
Low (<34%)	15.2	31	14	216	55	12	44	37	19
High (>60%)	16.3	38	17	254	53	11	57	47	19
College-oriented[e]									
No adv. lang.	15.3	33	15	221	54	12	48	41	19
Adv. lang.	15.9	35	17	250	56	08	56	45	19
Size[f]									
Small (<956)	15.4	33	14	205	55	09	41	37	16
Large (>1960)	15.8	35	16	257	52	13	55	47	21
Expenditure[g]									
Low exp. (<$1736)	15.2	32	14	197	49	11	42	38	19
High exp. (>$2457)	16.1	37	17	259	58	07	58	46	18

[a]Averaged across subject, weighted by number of teachers.
[b]Percent of the student body who are black.
[c]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."
[d]Percent of the student body who go on to regular colleges.
[e]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.
[f]Number of students.
[g]Average per-pupil spending in the relevant school district.

all teachers in that school with advanced degrees," i.e., M.A. or Ph.D.;[9] percent of all teachers 10 or more years in that school";[10] and "student/teacher ratio for the school as a whole."

The race, SES, college-bound, size, and expenditure comparisons in Table 2 are between the average values for the highest and lowest quartiles of schools; the cutoff points are shown in parentheses. Thus, for example, the high black schools were those with 25 percent or more black students (they averaged 53 percent), and the low black schools were those with no black students. Similarly, small schools had 956 or fewer students, large schools 1,960 or more students, and so forth.

In the cross-school comparison, there is no disaggregation by subject. Patterns of teacher qualifications do not differ appreciably in any of the comparisons because so many subject fields are conflated into a single number. The South appears slightly behind other regions in most measures, as do, to a lesser extent, high schools in nonmetropolitan (i.e., small-town or rural) districts.

High black schools tend to score slightly better on measures of teacher qualifications than do low black schools.[11] This tendency is reversed in the case of the SES comparisons, where the quartile with higher fractions of disadvantaged students shows slightly poorer teacher qualifications.

The differences in teacher qualifications are most pronounced when schools are grouped by the fraction of graduates bound for regular colleges.[12] High college-bound high schools do have more-qualified

---

[9]The subjects for which these degrees were granted are not reported in the HSB.

[10]Another HSB measure, the percent of last year's teachers who left the school for reasons other than death or retirement, showed no interesting variation.

[11]When the minority (i.e., including other non-whites and Hispanics) proportion was used instead of the black proportion, the results were quite similar.

[12]Surprisingly, the correlations between race of student body--as measured by either percent black or percent minority--and college attendance were close to zero. College attendance by graduating seniors was negatively correlated with the two SES measures (percent of students who dropped out and principal's judgment of the proportion of students from disadvantaged homes), but only at the level of -0.2.

teachers. The differences in teacher qualifications are almost as extreme for schools in high-spending vs. low-spending districts. College orientation and size of the school tend also to distinguish between highly qualified and less-qualified groups of teachers. Counter to prior expectations, these variables appear more important than SES or race.

The race and SES comparisons show no strong, consistent relationship with advanced degrees or teacher turnover, but large, high-spending, college-oriented schools do have more teachers with advanced degrees and with longevity. Student/teacher ratios differ only slightly or not very meaningfully in the various comparisons.

The schools of the South have higher fractions of black teachers and lower fractions of male teachers.[13] Also, salaries are consistently lower in the South and in nonmetropolitan schools. (These patterns also hold for individual subject fields, as discussed below.) Southern schools also show lower fractions of long-term teachers (i.e., teachers at the current school 10 years or more).

Subject and School Type

Table 3 summarizes our findings on teacher qualifications for 10 separate subject fields. The only measure of qualification reflected here is the teacher's total number of college courses in the subject. (Separate tables for each subject that also indicate other measures, such as percent with a major, experience, salary, and the like, are given in the Appendix.) In general, the other measures are correlated with number of courses, so a course count is a good capsule indicator.

The comparisons for vocational education teachers behave in a fashion generally contrary to those for teachers of "solid" subjects. Teacher qualifications tend to be stronger in schools with many low-SES students, schools with few college-bound students, small schools, schools in lower-spending districts, and schools that are not college-

[13]The two effects may not be unrelated, i.e., we may be observing a relative dearth of black male teachers in the South, because, as Strober and Tyack (1980) argue, Southern school districts may have been reluctant to hire males, who are viewed as less docile, or because black Southern males have traditionally regarded schoolteaching as "women's work."

Table 3

TEACHER QUALIFICATIONS, BY SUBJECT AND TYPE OF SCHOOL: 1980, 1982, 1984
(Number of college courses in PS)

Type of School	Subject									
	Voc. Ed.	Eng.	Mod. Lang.	Biol.	Chem.	Hist.	Govt.	Bas. Math	Int. Math	Adv. Math
All	13.5	18.5	18.5	17.5	13.7	14.1	12.0	11.4	14.2	15.6
Region										
Northeast	12.9	19.2	17.9	17.9	14.0	15.1	10.9	9.9	14.8	15.4
South	13.6	18.5	17.1	16.1	13.4	14.4	12.1	12.8	14.0	16.1
Midwest	13.6	18.7	19.1	18.3	14.1	13.4	10.9	12.2	13.6	16.7
West	13.4	17.9	19.7	18.3	12.9	13.5	13.7	9.0	14.6	12.8
Metro status										
Central city	14.1	19.0	17.9	17.5	14.6	15.1	13.8	11.4	14.8	14.2
Suburb	12.9	18.2	19.1	17.8	14.7	14.1	12.3	11.4	14.0	16.2
Nonmetro	13.7	18.5	17.6	16.8	11.3	12.9	9.7	11.4	14.0	14.8
Race										
High black (>25%)	13.1	18.8	18.3	17.0	13.0	16.0	12.1	11.7	13.9	15.8
Low black (0)	13.7	18.1	17.3	16.5	14.3	12.8	10.1	12.1	14.5	13.8
SES										
High dis. (>25%)	13.9	18.0	18.5	16.5	12.2	15.1	12.3	11.5	14.4	19.1
Low dis. (<3%)	13.1	18.7	19.0	17.8	13.0	14.2	12.1	13.0	14.2	16.5
College-bound										
Low (<34%)	13.9	17.8	17.4	16.4	12.3	13.8	12.2	12.2	13.4	14.7
High (>60%)	13.7	19.6	19.9	17.9	15.0	15.6	14.2	10.5	14.4	15.6
College-oriented										
No adv. lang.	13.7	18.2	17.6	17.0	12.0	13.7	11.1	11.4	14.4	13.7
Adv. lang.	13.0	19.2	19.3	18.3	16.4	14.8	13.6	11.1	13.8	17.6
Size										
Small (<956)	14.4	18.0	17.2	16.6	13.2	13.2	10.8	11.4	14.0	12.1
Large (>1960)	13.2	19.1	19.4	16.6	13.1	14.9	14.7	12.3	14.0	18.9
Expenditure										
Low exp. (<$1736)	14.2	18.2	17.0	15.4	12.9	13.7	10.8	11.9	14.3	18.0
High exp. (>$2457)	13.1	19.6	19.1	18.2	15.5	14.8	12.3	11.8	14.8	16.5

NOTE: Additional teacher qualification measures by school type appear in the Appendix.

oriented. The high black schools score slightly lower on most of the vocational education teacher qualification measures than their low black counterparts, a pattern consistent with the superior qualifications of teachers of the solid subjects in high black schools.

The comparison between English teachers and modern language (French, German, and Spanish) teachers can be used to test the proposition that where substitutability is easier, the less-privileged schools will differ more from their privileged counterparts. (For example, it should be easier to slot a less-qualified teacher into an English class than into a French class.) The expectation, then, is that schools that are "privileged" in terms of location, student body SES, size, spending, etc., would surpass their less-privileged counterparts more strikingly in English than in foreign languages.

But, on the contrary, Table 3 shows that in terms of number of courses taken by the teachers, less-privileged school types have relatively more poorly qualified modern language teachers than English teachers. When the comparisons focus on foreign language teachers instead of English teachers, schools in the South are further behind, schools in the suburbs are further ahead, and the advantages of college-oriented schools, schools with many college-bound students, large schools, and schools in high-spending districts are exaggerated.

In none of the subject comparisons (biology vs. chemistry, government vs. history, advanced vs. intermediate vs. basic math) were there larger differences between privileged and less-privileged schools in the subject in which teachers were more substitutable. These findings suggest that the less-privileged schools are not as rigorous in the hiring of teachers for more "esoteric" subjects, whereas the teachers of the more "mundane" subjects are fairly similar to those in the more-privileged schools.

A similar pattern holds for humanities and science teachers--a slight disadvantage for the South and an advantage for the suburbs. Proportion of students college-bound and district spending make the big difference in the two-way comparisons, but low SES looms somewhat larger as a disadvantage for biology and chemistry teachers. Chemistry teachers are slightly better prepared in low black than high black high

schools, the only "solid" subject besides intermediate math where race has this effect.

The regional and suburban advantages fade for history and civics teachers, where location in a central city does seem to be associated with higher teacher qualifications. History and civics teachers appear more qualified in schools with relatively more black pupils and low-SES pupils. But high college-bound schools have more-qualified history teachers, and large schools have more-qualified government/civics teachers.

No very strong regional or metropolitan status patterns emerge for math teachers. Basic math teachers in the privileged schools, like the vocational education teachers in these schools, seem to have poorer qualifications than those in the less-privileged schools. Advanced math teachers demonstrate the opposite pattern, while intermediate math teacher do not show much of any pattern at all.

Recapitulation

What can we conclude from these cross-tabulations? Race and SES of the school do not perform as expected. In most cases (6 out of 9 "solid" subjects), the quartile of schools that averaged over 50 percent black students had more-qualified teachers than the comparison schools with no black students. Low-SES schools usually had less-qualified teachers, subject-by-subject, but the effect was always less than that conveyed by the other, more "objective" school-type differences. Of those, student body size and the fraction of students going on to college seemed to account for the widest differences in the most subjects, followed by college orientation and district spending.

There is, then, some modest evidence that an "elite" group of American public high schools does exist. Big schools in high-spending districts that plan to and succeed in sending many students on to college appear to have the most-qualified teachers, when qualifications are measured by the teachers' college training (and, as shown in the Appendix, experience and salary). These schools are likely to be in regions other than the South and are most often in the suburbs, or to a lesser extent, the central city; they are least often in small towns or rural locations. But the "elite" schools, so defined, are not

necessarily white schools, and many of them have high proportions of low-income students.

IDENTIFYING HIGH-QUALIFICATION AND LOW-QUALIFICATION SCHOOLS

We next attempted to develop a more rigorous definition of meaningful school types. Although multivariate models using school characteristics as independent variables are relatively unsuccessful in explaining the variation in levels of qualification across teachers, simple correlation coefficients do seem of some use in identifying school characteristics that vary systematically with teacher qualifications.

Table 4 shows these correlation coefficients between school characteristics and teacher qualifications. Both the 20-course and the 13-course standard for college major are indicated. A new qualification measure, the "normalized" course number count, is included here. This is the actual number of courses in her or his PS taken by an individual teacher, divided by the mean number of courses taken by all teachers of that same PS in the HSB sample.

The correlation between student body size and school-district spending on the one hand and measures of teacher qualifications on the other, although admittedly small, does exceed the correlation with student body ethnicity (percent black, percent minority) and the dropout rate. Among the attributes of the student body, the percent college-bound and the percent disadvantaged again seem to be the most potent variables.

Of the locational variables, only nonmetropolitan status (i.e., located in a small town or rural area outside of an officially designated metropolitan area) seems to be powerfully connected to the teacher qualification measures. The "disadvantage" of being in the South is consistent, but rather negligible on all measures except salary.

The findings in Table 4 were used to define the school types whose characteristics are consistently associated with low and high levels of teacher qualifications. Table 5 lists the criteria for assigning a school to either the X (low qualifications) or Y (high qualifications) category. The criteria--large vs. small, high spending vs. low

Table 4

RELATIONSHIP OF SCHOOL CHARACTERISTICS TO SELECTED MEASURES OF TEACHER QUALIFICATIONS
(Correlation coefficients)

School Characteristic	Measures of Teacher Qualifications					
	Courses in PS		% Major in PS		% Minor in PS	Salary
	Total	Norm.	20 Courses	13 Courses		
Student body size	.03	.04	.04	.04	−.01	.36
Dist. spend per pupil	.06	.07	.05	.05	.03	.35
Metro status						
Suburb	.01	.00	.00	.01	.01	.18
City	.02	.03	.03	.02	.00	.11
Nonmetro	−.03	−.04	−.03	−.03	−.01	−.31
Region						
Northeast	.02	.02	.01	.01	.00	.09
South	−.02	−.02	−.01	−.01	.00	−.39
Midwest	.01	.01	.00	.01	.02	.16
West	.00	−.01	.01	.00	−.02	.18
Student body						
% Black	−.01	.00	.01	.00	−.03	−.04
% Minority	−.01	.00	.02	−.01	−.04	.02
% Disadvantaged	−.04	−.03	−.01	−.04	−.04	−.13
% Dropouts	−.01	−.01	−.01	.00	−.01	−.03
% College bound	.07	.06	.07	.05	.03	.26

Table 5

CRITERIA FOR TYPE X AND TYPE Y SCHOOLS

Criterion	Type X	Type Y
Student body size	1,493 or fewer	1,494 or more
Annual district spending per pupil	$2,142 or less	$2,143 or more
Metro status	Nonmetropolitan	Suburb or city
Disadvantaged students	20 percent or more	19 percent or less
College-bound students	45 percent or less	46 percent or more

spending, etc.--were based on the mean values of these characteristics in the entire sample. A given school must meet all the criteria to be assigned to a type.

Thus a type X school has fewer than 1,494 students *and* is in a district that spends less than $2,143 per pupil per year *and* is located outside an SMSA *and* has at least 20 percent disadvantaged student body *and* sends fewer than 45 percent of its graduates on to regular colleges. A total of 22 schools, containing 483 teachers, were classified as type X; 24 schools, with 587 teachers, met the Y criteria. Their characteristics are shown in Table 6.

The Y schools tended to be more than twice as large as the X schools and to be in districts that spent almost twice as much per pupil. By design, the Y schools were all in metropolitan areas, either central cities or suburbs, while the X schools were all nonmetropolitan. The X schools turned out to be disproportionately in the South; the Y schools were more evenly distributed across the four regions of the country. The average X school had a higher proportion of minority

Table 6

CHARACTERISTICS OF TYPE X AND TYPE Y SCHOOLS

Characteristic	Type X	Type Y
Average student body size	880	2,213
Average district spending per pupil	$1,620	$2,951
Metro status (%)		
Suburb	0	83
City	0	17
Nonmetro	100	0
Region (%)		
Northeast	5	29
South	53	21
Midwest	20	32
West	22	17
Student body (average %)		
Black	9	15
Minority	12	7
Disadvantaged	26	7
Dropout	20	5
College bound	28	64

students (but a lower percentage black), as well as a higher proportion of dropouts and, of course, disadvantaged. Again, by design, the Y schools sent higher proportions of graduates to college.

Table 7 shows the differences in the qualifications of teaching staffs and in the facilities offered to students in the two types of schools. Even between these polar extremes of school types, the differences in teacher qualifications overall are rather modest: Y school teachers had 6 percent more courses in their PS than the average for all teachers of the same subject, while X school teachers had 3 percent less. The proportions who had majored or minored in their PS were consistently higher for Y school teachers, but not by a great deal. The teachers in the Y schools had four more years of experience, on the average, but whether 14 years of experience is any different from 18 years in terms of educational value to students is far from clear. The salary differences between X and Y schools were, however, substantial.

In the subject-by-subject comparisons, the advantages of the Y schools were generally confirmed. In all of the "solid" subjects except chemistry and mathematics, the Y schools had the more-qualified teachers. The advantage in number of courses ranged from two to six, and the advantage in percent majoring in the PS (13-course standard) was from 10 to 29 percentage points. None of the X schools had any Latin or Greek teachers, or at least none appeared in the HSB sample.

It is interesting to speculate as to why chemistry and math teachers in the X schools were just about as qualified as those in the Y schools. Perhaps in these subjects a certain minimum of preparation is essential, and teachers with qualifications much above the minimum may not be available (i.e., they may be attracted away to superior opportunities, no matter what kind of school they teach in).

The discrepancies between X and Y schools, as measured by the courses they offer their students, are more pronounced than those measured by teacher qualifications. All of the Y schools had courses in third-year French and Spanish and in calculus. Almost all offered third-year German, computer instruction, and advanced placement (college) courses. The X schools did not do nearly as well in matching these offerings. On the other hand, although not included in the tables in

Table 7

TEACHER QUALIFICATIONS AND OFFERINGS
IN TYPE X AND TYPE Y SCHOOLS

Characteristic	Type X	Type Y
All teachers		
No. college courses in PS	15	17
No. courses in PS, normalized	0.97	1.06
Percent with 20-course major in PS	29	39
Percent with 13-course major in PS	55	66
Percent with minor (8 courses) in PS	82	86
Years of experience	14	18
Average salary ($ thousands)	19.2	27.4
Teachers, by subject[a]		
Education (physical, special)	14/50	18/67
Vocational education	13/49	13/49
English	18/78	20/88
Classics	0/0	23/100
Modern languages	18/60	20/78
Biology	16/59	22/87
Chemistry	14/41	14/52
Other science	11/27	17/56
History	13/41	17/70
Government	12/42	15/69
Basic math	12/28	10/20
Intermediate math	14/52	14/50
Special courses offered (% of schools)		
Third-year German	22	68
Third-year French	100	100
Third-year Spanish	53	100
Computer courses	15	79
Calculus	0	100
Advanced placement courses	27	79

[a]Number of courses in PS/percent with 13-course major in PS. Statistics limited to subjects in which the number of teachers exceeded 10, and the number of schools 8.

this Note, student/teacher ratios, library volumes per student, and self-reports of teacher practices differed only negligibly between X and Y schools.

Where Do "Unqualified" Teachers Teach?

A final step in the analysis was designed to answer the following questions: Do the schools at which the least-qualified teachers are employed differ markedly from the average high school in the sample? If so, in what respects? We drew two subsamples from the HSB, one made up of all teachers whose PS was a "solid" and who did not have certifications in the courses they taught, and one made up of all teachers who did not even have a minor (eight college courses) in their PS. There turned out to be 399 teachers in the first subsample and 778 teachers in the second. Table 8 show how the schools employing such teachers compared with the schools employing the average teacher in the HSB data.

Generally, the schools that employ these "unqualified" teachers do not look very different from the typical high school portrayed in the database. All three groups are close in student body size and spending and are similar in their college-bound fractions and advanced foreign language offerings. None of the locational differences are striking. The proportions of minority and disadvantaged students are somewhat higher in schools with uncertified teachers.

Lack of certification and, to a lesser extent, lack of a minor seem to be more a function of the seniority of the teacher than of the characteristics of the school where she or he teaches. Uncertified teachers had an average of only 11 years of teaching experience, whereas the average teacher had more than 16 years. Perhaps as time goes on, most teachers eventually attain certification in the subjects they teach, or, failing to become certified, they decide to leave teaching, so that no very striking differences mark their employing schools.

Table 8

CHARACTERISTICS OF SCHOOLS WITH "UNQUALIFIED" TEACHERS OF SOLID SUBJECTS

Characteristics	Average School	Schools Whose Teachers Lack	
		Certification	Minor in PS
Student body size	1,494	1,499	1,507
Average district spending per pupil	$2,142	$2,040	$2,806
College-bound students (%)	46	48	45
Schools with third-year modern language	37	27	33
Region (%)			
Northeast	20	23	20
South	29	38	30
Midwest	30	21	27
West	21	18	23
Urban status (%)			
Central city	26	34	26
Suburb	46	36	45
Nonmetro	28	29	29
Student body			
% Black	16	24	18
% Minority	26	37	29
% Disadvantaged	19	25	21
% Dropouts	12	13	12

A NOTE ON TEACHER PRACTICES

The HSB survey also collected information on teacher practices. However, the answers teachers gave varied so little by subject field or school type that one must conclude that either teacher practice is remarkably standard or teachers know what is expected of them and give very similar answers to surveyors no matter what their PS or school. There was no interesting variation in any of the following variables:

- The amount of time the teacher spends preparing lessons or tests out of the classroom (virtually all spend 8 to 10 hours per week).
- The amount of time the teacher spends reading in the subject out of the classroom (virtually all spend 3 to 4 hours per week).

- The number of major exams the teacher gives during the semester (virtually all give 3 to 4 exams).
- The average minutes of homework the teacher assigns per night (virtually all assign 20 to 30 minutes).
- The percent of homework assigned that the teacher grades and returns (virtually all return 70 to 80 percent).
- Teacher absenteeism (virtually all teachers report being absent 4 or 5 days per semester).

Also, in all subjects and school types, a consistent 70 to 80 percent of teachers say they are "satisfied" or "mostly satisfied" with their schools.

This suggests that methods of probing teacher practices will have to be improved in future surveys of American school teachers. If the HSB could produce no more interesting findings than those indicated above, it is likely that either the sample design or the form in which the questions were put to teachers or the methods of conducting interviews were inadequate. It seems unlikely that high school teachers are really as standardized in their approaches as the HSB statistics indicate.

III. CONCLUSIONS

REPRISE OF FINDINGS

What, then, does the HSB database tell us about the state of teacher qualifications in America's high schools? The average high school "solid" subject teacher has taken 16 college courses in the subject she or he most frequently teaches. About three-fifths majored in that subject (by the 13-course standard), and about four-fifths have at least a minor in that subject (by the 8-course standard). The vast majority of teachers, however, are certified in all subjects taught. The average teacher has had 15 years of teaching experience.

In the social sciences and mathematics, less than half of the teachers, on average, majored in their PS, but even in those fields (except for computer instruction) more than three-fourths of the teachers have at least a minor in their PS. American high school teachers, according to the HSB results, seem on the whole to be better qualified to teach the courses to which they are assigned than Robinson and Pierce's earlier study would suggest. However, exposing as many as one-tenth of all high school students to classics, chemistry, physics, social science, and math teachers who do not have even a minor in their courses may pose a problem. Students in economics, government, and basic mathematics courses appear least likely to encounter a teacher who has attained at least a minor in the subject.

The inequalities in teacher qualifications across schools of different types are hardly overwhelming.[1] Generally, American high

[1]The results discussed in this section are based on the cross-tabulations and correlations shown in the tables in earlier sections. They are bolstered by multivariate estimates, using ordinary and two-staged least squares and logit. Except where salary was the dependent variable, the regressions tended to explain little of the overall variation in any of the teacher qualification measures--R squares were typically 0.02 to 0.08--but they did generate t values for some of the independent variables that would pass muster at confidence levels of 0.80 or 0.90 or 0.95. Thus, conclusions that characteristics such as school size, district spending, or college-bound fraction are associated with the measures of teacher qualifications are made with a fair degree of confidence that they are based on a truly independent effect.

schools do not differ greatly in the qualifications of teachers for the courses they offer. Nevertheless, some of the cross-school differences deserve comment.

Surprisingly, racial and ethnic characteristics of a school's student body are only weakly associated with the qualifications of its teachers. Often the relationship is the reverse of what one might expect, i.e., schools with larger proportions of minority students have the more-qualified teachers. And when the linkage between school ethnicity and teacher qualifications is in the expected direction, ethnicity is often less significant than other attributes of the student body.

The student body attributes most strongly linked with teacher qualifications proved to be, in order of strength, fraction of students going on to regular college and fraction deemed "disadvantaged" by the school principal. The former was associated with higher teacher qualifications and the latter with lower qualifications. (Neither is highly correlated with student body ethnicity.) School dropout rate tends to have only a negligible connection with teacher qualifications.

The locational advantages, although small in comparison to some other school and district characteristics, accrue to districts outside the South and inside metropolitan areas. If the multivariate estimates can be believed, these geographical effects are independent of the effects of spending levels and student body attributes.

Larger schools generally have the more-qualified teachers. Why should this be so? It may be a consequence of self-selection. Big schools offer more specialized courses and therefore attract more highly prepared teachers who prefer to work in environments where they are given the opportunity to use their knowledge. Tempering this effect is the possibility that smaller schools tend to drop courses rather than assign unqualified teachers to cover them.[2] (Such a pattern is suggested in the data on the X and Y type schools presented in Table 7 above.) Thus, students attending smaller high schools may face a double disadvantage: less-qualified teachers and fewer higher-level courses.

---

[2]The ironic result is that schools that do not offer difficult-to-staff courses can appear to have the more-qualified teachers, as discussed in Sec. I.

For similar reasons, perhaps, rural and small-town school systems do not have the best-educated teacher force.

That districts with higher spending levels should employ the better prepared teachers is not so surprising. These more-affluent systems may also encourage inservice training for the teachers they hire, thus adding to the initial advantages of their teacher forces. They may also have assignment policies that are more sensitive to variations in course offerings across high schools.

POLICY IMPLICATIONS

What is the policy relevance of these findings?

First, the small differences across different types of schools suggest that the widespread perception of school inequalities is not well supported by quantitative, "objective" measures of teacher qualifications. At the same time, of course, it is entirely possible that teachers in different types of schools do differ in depth of knowledge, teaching skills, commitment, and enthusiasm. But to derive educational indicators on the basis of the kind of data in the HSB study, and then to base policy changes on those indicators, would seem wrongheaded at this juncture.

Second, it must be emphasized that there is no conclusive evidence that the number of courses a teacher has taken is related to her or his subject matter knowledge or that teachers' subject matter knowledge is, in turn, related to the achievement of students. (See, for example, Byrne, 1983; Summers and Wolfe, 1975; Druva and Anderson, 1983.)

Third, if it should be determined that there is a link among these variables, there are a number of modest differences across school types that might merit some attention.

As we have seen, teacher qualifications would appear to be somewhat higher in large, college-oriented secondary schools in high-spending metropolitan districts.[3] These differences tend to work against guarantees of equality of educational opportunity within states and may

[3]As mentioned, the practice of assigning teachers to courses outside their PS, even when they are not qualified for these other subjects, may vary with school type. The HSB data do not illuminate that topic.

shortchange students and parents in poorer and nonmetropolitan districts.[4] The users of small high schools, wherever they are, may suffer similar disadvantages.

More ambiguous, from a policy perspective, is the finding that the most highly qualified teachers are found in high schools with more college-bound graduates and fewer disadvantaged students. This no doubt raises issues of efficiency vs. equity. It is plausible to assume that the highly trained teacher adds more to the achievement of the college-bound student than to that of the non-college-bound, many of whom are disadvantaged. But although these latter students may not "need" teachers who are as highly qualified, this does not mean that they "deserve" less-qualified teachers. In fact, it could be argued that to achieve greater equality in educational outcomes, the "best" teachers should be assigned work with the "worst" students. Deciding how to match teachers and students, even if the wishes of the teachers themselves did not have to be considered, constitutes a moral dilemma of the type that permeates not only educational policy, but social policy in general.

---

[4]These results may also reinforce the importance of interdistrict school finance equalization.

Appendix

CHARACTERISTICS OF TEACHERS OF SELECTED SUBJECTS

Table A.1

VOCATIONAL EDUCATION TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(1,454 teachers in 327 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Nonwhite
All	13.5	30	16	234	59	12
Region						
Northeast	12.9	26	17	246	64	06
South	13.6	30	15	205	48	19
Midwest	13.6	32	16	243	64	10
West	13.4	29	16	250	67	08
Metro status						
Central city	14.1	32	18	254	56	23
Suburb	12.9	27	16	239	58	09
Nonmetro	13.7	32	15	204	65	06
Race[a]						
High black (>25%)	13.1	67	17	234	48	33
Low black (0)	13.7	69	15	221	66	04
SES[b]						
High dis. (>25%)	13.9	31	16	229	56	27
Low dis. (<3%)	13.1	29	16	237	59	06
College-bound[c]						
Low (<34%)	13.9	29	15	219	58	11
High (>60%)	13.7	28	17	249	56	12
College-oriented[d]						
No adv. lang.	13.7	31	15	222	59	13
Adv. lang.	13.0	28	18	255	60	08
Size[e]						
Small (<956)	14.4	35	14	203	61	07
Large (>1960)	13.2	27	17	263	57	15
Expenditure[f]						
Low exp. (<$1736)	14.2	33	14	201	53	10
High exp. (>$2457)	13.1	29	17	260	61	10

[a]Percent of the student body who are black.
[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."
[c]Percent of the student body who go on to regular colleges.
[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.
[e]Number of students.
[f]Average per-pupil spending in the relevant school district.

Table A.2

ENGLISH TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(1,368 teachers in 330 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Nonwhite
All	18.5	46	15	227	32	10
Region						
Northeast	19.2	50	16	242	40	03
South	18.5	43	14	190	17	19
Midwest	18.7	45	16	242	40	08
West	17.9	41	16	251	35	06
Metro status						
Central city	19.0	49	18	248	28	21
Suburb	18.2	42	15	236	33	07
Nonmetro	18.5	44	13	195	32	06
Race[a]						
High black (>25%)	18.8	45	16	226	26	30
Low black (0)	18.1	41	14	216	34	03
SES[b]						
High dis. (>25%)	18.0	41	15	216	26	23
Low dis. (<3%)	18.7	48	16	239	33	06
College-bound[c]						
Low (<34%)	17.8	39	14	205	29	11
High (>60%)	19.6	52	16	254	28	13
College-oriented[d]						
No adv. lang.	18.2	42	15	217	30	12
Adv. lang.	19.2	49	17	247	34	08
Size[e]						
Small (<956)	18.0	40	13	198	30	08
Large (>1960)	19.1	50	16	254	30	13
Expenditure[f]						
Low exp. (<$1736)	18.2	41	14	188	24	09
High exp. (>$2457)	19.6	53	17	259	36	06

[a]Percent of the student body who are black.

[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."

[c]Percent of the student body who go on to regular colleges.

[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.

[e]Number of students.

[f]Average per-pupil spending in the relevant school district.

Table A.3

MODERN LANGUAGE TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(363 teachers in 210 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Nonwhite
All	18.5	44	16	234	35	06
Region						
Northeast	17.9	40	17	242	40	02
South	17.1	33	14	192	21	10
Midwest	19.1	46	15	239	33	05
West	19.7	56	17	259	47	06
Metro status						
Central city	17.9	39	17	244	35	06
Suburb	19.1	48	16	243	35	03
Nonmetro	17.6	41	17	203	34	10
Race[a]						
High black (>25%)	18.3	44	16	219	26	09
Low black (0)	17.3	34	14	217	31	06
SES[b]						
High dis. (>25%)	18.5	47	16	228	38	10
Low dis. (<3%)	19.0	49	16	243	36	05
College-bound[c]						
Low (<34%)	17.4	37	14	217	36	06
High (>60%)	19.9	55	17	258	36	06
College-oriented[d]						
No adv. lang.	17.6	39	16	226	34	08
Adv. lang.	19.3	48	17	242	35	04
Size[e]						
Small (<956)	17.2	38	15	204	30	09
Large (>1960)	19.4	52	17	256	36	04
Expenditure[f]						
Low exp. (<$1736)	17.0	36	14	206	30	06
High exp. (>$2457)	19.1	43	18	257	37	06

[a]Percent of the student body who are black.
[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."
[c]Percent of the student body who go on to regular colleges.
[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.
[e]Number of students.
[f]Average per-pupil spending in the relevant school district.

Table A.4

BIOLOGY TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(409 teachers in 251 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Non-white
All	17.5	38	16	232	65	11
Region						
Northeast	17.9	38	16	252	65	05
South	16.1	30	14	190	49	19
Midwest	18.3	45	18	253	73	10
West	18.3	40	16	251	80	05
Metro status						
Central city	17.5	39	16	234	61	24
Suburb	17.8	39	17	253	67	06
Nonmetro	16.8	33	14	194	65	08
Race[a]						
High black (>25%)	17.0	38	16	222	50	32
Low black (0)	16.5	32	15	219	72	01
SES[b]						
High dis. (>25%)	16.5	30	14	215	58	21
Low dis. (<3%)	17.8	40	17	250	72	06
College-bound[c]						
Low (<34%)	16.4	29	13	222	65	11
High (>60%)	17.9	42	17	253	70	11
College-oriented[d]						
No adv. lang.	17.0	34	15	214	60	12
Adv. lang.	18.3	44	18	262	73	10
Size[e]						
Small (<956)	16.6	29	14	209	67	06
Large (>1960)	16.6	37	16	259	66	15
Expenditure[f]						
Low exp. (<$1736)	15.4	24	14	197	58	10
High exp. (>$2457)	18.2	43	18	270	71	06

[a]Percent of the student body who are black.

[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."

[c]Percent of the student body who go on to regular colleges.

[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.

[e]Number of students.

[f]Average per-pupil spending in the relevant school district.

Table A.5

CHEMISTRY TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(201 teachers in 177 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Expe-rience	Salary ($ 000)	% Male	% Non-white
All	13.7	20	18	246	68	07
Region						
Northeast	14.0	18	19	265	70	04
South	13.4	23	16	197	50	13
Midwest	14.1	21	19	258	73	05
West	12.9	17	19	270	87	03
Metro status						
Central city	14.6	30	19	261	66	13
Suburb	14.7	24	19	254	62	06
Nonmetro	11.3	05	17	220	79	04
Race[a]						
High black (>25%)	13.0	22	17	242	62	30
Low black (0)	14.3	19	19	239	82	02
SES[b]						
High dis. (>25%)	12.2	21	18	224	59	15
Low dis. (<3%)	13.0	14	18	262	69	05
College-bound[c]						
Low (<34%)	12.3	10	18	225	65	12
High (>60%)	15.0	31	19	273	74	07
College-oriented[d]						
No adv. lang.	12.0	13	17	236	70	09
Adv. lang.	16.4	32	17	262	64	04
Size[e]						
Small (<956)	13.2	18	19	232	75	09
Large (>1960)	13.1	17	19	274	70	05
Expenditure[f]						
Low exp. (<$1736)	12.9	18	16	200	61	11
High exp. (>$2457)	15.5	22	20	283	70	07

[a]Percent of the student body who are black.
[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."
[c]Percent of the student body who go on to regular colleges.
[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.
[e]Number of students.
[f]Average per-pupil spending in the relevant school district.

Table A.6

HISTORY TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(678 teachers in 298 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Nonwhite
All	14.1	24	17	241	76	08
Region						
Northeast	15.1	29	17	256	79	05
South	14.4	28	15	199	65	16
Midwest	13.4	18	18	254	83	05
West	13.5	23	17	262	79	06
Metro status						
Central city	15.1	30	19	259	74	16
Suburb	14.1	22	17	251	74	06
Nonmetro	12.9	21	14	203	84	04
Race[a]						
High black (>25%)	16.0	34	17	244	65	21
Low black (0)	12.8	15	16	226	85	03
SES[b]						
High dis. (>25%)	15.1	31	17	235	69	19
Low dis. (<3%)	14.2	23	16	249	74	06
College-bound[c]						
Low (<34%)	13.8	24	15	224	80	11
High (>60%)	15.6	31	17	266	71	08
College-oriented[d]						
No adv. lang.	13.7	23	16	230	77	09
Adv. lang.	14.8	26	18	260	76	06
Size[e]						
Small (<956)	13.2	20	15	210	79	06
Large (>1960)	14.9	27	18	271	75	12
Expenditure[f]						
Low exp. (<$1736)	13.7	25	15	202	77	11
High exp. (>$2457)	14.8	27	18	269	77	05

[a]Percent of the student body who are black.

[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."

[c]Percent of the student body who go on to regular colleges.

[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes,

[e]Number of students.

[f]Average per-pupil spending in the relevant school district.

Table A.7

CIVICS AND GOVERNMENT TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(171 teachers in 140 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Nonwhite
All	12.0	16	15	233	71	15
Region						
Northeast	10.9	17	17	225	56	11
South	12.1	18	17	197	57	27
Midwest	10.9	11	17	252	80	07
West	13.7	21	19	268	87	11
Metro status						
Central city	13.8	29	18	247	56	35
Suburb	12.3	16	15	243	75	10
Nonmetro	9.7	06	14	204	77	09
Race[a]						
High black (>25%)	12.1	24	14	213	51	44
Low black (0)	10.1	07	14	230	80	05
SES[b]						
High dis. (>25%)	12.3	20	13	205	60	32
Low dis. (<3%)	12.1	19	16	252	68	12
College-bound[c]						
Low (<34%)	12.2	21	15	219	73	20
High (>60%)	14.2	26	18	253	66	24
College-oriented[d]						
No adv. lang.	11.1	14	14	222	70	18
Adv. lang.	13.6	20	18	254	72	10
Size[e]						
Small (<956)	10.8	14	14	201	69	14
Large (>1960)	14.7	23	19	261	64	18
Expenditure[f]						
Low exp. (<$1736)	10.8	15	13	196	61	17
High exp. (>$2457)	12.3	17	16	260	67	07

[a]Percent of the student body who are black.
[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."
[c]Percent of the student body who go on to regular colleges.
[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.
[e]Number of students.
[f]Average per-pupil spending in the relevant school district.

Table A.8

BASIC MATHEMATICS TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(250 teachers in 165 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Nonwhite
All	11.4	16	14	209	80	40
Region						
Northeast	9.9	13	11	211	62	15
South	12.8	24	14	183	46	27
Midwest	12.2	17	16	229	33	18
West	9.0	04	15	238	78	11
Metro status						
Central city	11.4	20	14	219	43	33
Suburb	11.4	13	14	219	45	13
Nonmetro	11.4	15	16	189	32	10
Race[a]						
High black (>25%)	11.7	22	17	196	46	41
Low black (0)	12.1	16	12	204	71	04
SES[b]						
High dis. (>25%)	11.5	20	13	194	81	32
Low dis. (<3%)	13.0	23	13	215	60	10
College-bound[c]						
Low (<34%)	12.2	21	13	194	49	30
High (>60%)	10.5	16	12	229	40	18
College-oriented[d]						
No adv. lang.	11.4	17	13	204	61	20
Adv. lang.	11.1	16	15	224	59	16
Size[e]						
Small (<956)	11.4	17	11	188	42	14
Large (>1960)	12.3	22	14	225	44	23
Expenditure[f]						
Low exp. (<$1736)	11.9	21	13	188	46	22
High exp. (>$2457)	11.8	18	16	238	68	16

[a]Percent of the student body who are black.
[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."
[c]Percent of the student body who go on to regular colleges.
[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.
[e]Number of students.
[f]Average per-pupil spending in the relevant school district.

Table A.9

INTERMEDIATE MATH TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(733 teachers in 348 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Experience	Salary ($ 000)	% Male	% Non-white
All	14.2	24	16	235	60	10
Region						
Northeast	14.8	25	16	243	58	04
South	14.0	23	15	195	41	19
Midwest	13.6	23	17	254	68	07
West	14.6	29	17	258	77	09
Metro status						
Central city	14.8	29	17	242	55	23
Suburb	14.0	23	17	250	59	07
Nonmetro	14.0	23	15	205	66	05
Race[a]						
High black (>25%)	13.9	26	15	230	47	34
Low black (0)	14.5	26	16	227	75	01
SES[b]						
High dis. (>25%)	14.4	28	15	222	50	26
Low dis. (<3%)	14.2	24	17	252	67	04
College-bound[c]						
Low (<34%)	13.4	21	15	225	63	09
High (>60%)	14.4	25	17	258	56	13
College-oriented[d]						
No adv. lang.	14.4	25	15	224	60	13
Adv. lang.	13.8	23	17	252	61	07
Size[e]						
Small (<956)	14.0	23	16	214	62	09
Large (>1960)	14.0	24	15	258	56	14
Expenditure[f]						
Low exp. (<$1736)	14.3	24	15	197	53	11
High exp. (>$2457)	14.8	27	17	267	63	11

[a]Percent of the student body who are black.

[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."

[c]Percent of the student body who go on to regular colleges.

[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.

[e]Number of students.

[f]Average per-pupil spending in the relevant school district.

Table A.10

ADVANCED MATH TEACHER CHARACTERISTICS, BY TYPE OF SCHOOL
(84 teachers in 73 schools)

Type of School	Characteristic					
	No. of Courses in PS	% with PS Major (20)	Years Expe-rience	Salary ($ 000)	% Male	% Non-white
All	15.6	30	19	272	81	01
Region						
Northeast	15.4	18	19	265	76	00
South	16.1	47	16	222	88	06
Midwest	16.7	35	20	300	98	00
West	12.8	13	18	278	94	00
Metro status						
Central city	14.2	15	22	283	85	08
Suburb	16.2	35	19	288	81	00
Nonmetro	14.8	26	17	222	84	00
Race[a]						
High black (>25%)	15.8	36	15	230	63	09
Low black (0)	13.8	26	16	260	78	00
SES[b]						
High dis. (>25%)	19.1	42	17	233	75	08
Low dis. (<3%)	16.5	28	21	295	82	00
College-bound[c]						
Low (<34%)	14.7	21	20	253	79	00
High (>60%)	15.6	29	20	290	86	00
College-oriented[d]						
No adv. lang.	13.7	27	18	256	80	00
Adv. lang.	17.6	33	20	291	83	03
Size[e]						
Small (<956)	12.1	11	17	239	89	00
Large (>1960)	18.9	44	16	303	81	00
Expenditure[f]						
Low exp. (<$1736)	18.0	33	21	225	80	07
High exp. (>$2457)	16.5	26	18	280	91	00

[a]Percent of the student body who are black.
[b]As reflected by the school principal's judgment of the fraction of the student body that are "disadvantaged."
[c]Percent of the student body who go on to regular colleges.
[d]The "college orientation" of the school was proxied by whether or not it offers third-year German, French, and Spanish classes.
[e]Number of students.
[f]Average per-pupil spending in the relevant school district.

REFERENCES

Byrne, C. J. (1983). "Teacher Knowledge and Teacher Effectiveness," Paper presented at the meeting of the Northeastern Educational Research Association, Ellenville.

Druva, C. A., and R. D. Anderson (1983). "Science Teacher Characteristics by Teacher Behavior and by Student Outcome," *Journal of Research in Science Teaching*, 20(5):467-479.

Galambos, E. C., L. M. Cornett, and H. D. Spitler (1985). *An Analysis of Transcripts of Teachers and Arts and Sciences Graduates*, Atlanta, Southern Regional Education Board.

Robinson, V., and C. Pierce (1985). *Making Do in the Classroom: A Report on the Misassignment of Teachers*, Washington D.C., Council for Basic Education in cooperation with the American Federation of Teachers.

Roth R. A., and R. Mastain (1984). *Manual on Certification and Preparation of Educational Personnel in the United States*, National Association of State Directors of Teacher Education and Certification.

Strober, M. H., and D. B. Tyack (1980). "Why Do Women Teach?" *Signs*, 3(5), Spring.

Summers, A. A., and B. L. Wolfe (1975). *Equality of Educational Opportunity Quantified: A Production Function Approach*, Department of Research, Federal Reserve Bank of Philadelphia.

Task Force on Teacher Certification (1984). *Emergency Teacher Certification*, Washington D.C., American Association of Colleges for Teacher Education.